NREL Wind Technical Assistance to Mexico Renewable Energy Program

by David Corbus 12/99

Background

The Mexico Renewable Energy Program helps expand the use of renewable energy, primarily photovoltaic and wind energy, in rural, off-grid applications. The program is cosponsored by the U.S. Department of Energy and the United States Agency for International Development (USAID) and managed by Sandia National Laboratories with the National Renewable Energy Laboratory (NREL) providing technical assistance for wind projects. The project approach emphasizes sustainability and developing in-country institutional capacity.

The NREL program team is working with Mexican organizations within established and funded programs to incorporate the use of renewable energy technologies where they provide the best technical and economic solutions. The team provides training and technical assistance to the pilot project staff to help institutionalize the use of renewable energy technologies in Mexico.

Scope

Program goals include increasing the demand for the appropriate and sustainable use of renewable energy technologies, thereby expanding markets for the U.S. renewable energy industry, and increasing the use of renewable energy technologies as a mechanism for combating global climate change, specifically by reducing greenhouse gas emissions.

More than 200 photovoltaic systems and several wind energy systems have already been installed, including a 10-kW wind/diesel system for an ecotourism resort. Significant near-term replication of these projects is under way with the major program partner, Fideicomiso de Riesgo Compartido (FIRCO), a federal, shared-risk trust fund operating under Mexico's agriculture department. FIRCO is setting one of Mexico's largest agricultural development programs in motion, and Sandia and NREL are providing technical assistance as FIRCO begins to install hundreds of renewable energy projects (mostly for water pumping).

The Mexico program is divided into specific program areas and cross-cutting activities that include work with FIRCO at both the state and national levels. The program also has ongoing projects with several state agencies in Chihuahua, Sonora, Baja California Sur, Quintana Roo, Oaxaca, Veracruz, and other states. In addition, cooperative projects are underway with Conservation International, the Nature Conservancy, World Wildlife Fund, and several local organizations to incorporate renewable energy into ongoing activities for protected-area management in Mexico. The program's cross-cutting activities include solar and wind resource assessment, training, technical and economic analysis, financing mechanisms, industry interactions, project monitoring and evaluation, and environmental assessments.

NREL's approach emphasizes sustainability and infrastructure by:

- Working with established Mexican organizations
- Working within established and funded programs
- Providing training in technologies, applications, and project implementation
- Providing technical assistance and cost-shared funding for pilot projects.

The program's emphasis is on productive uses, such as pumping water for livestock or crop irrigation, lighting for commercial or business activities, and ecotourism. Such uses:

- Provide economic and social benefits
- Have a high degree of sustainability and replicability because they provide a mechanism for paying for renewable energy systems
- Compete with subsidized renewable energy programs in Mexico.

NREL Activities

NREL helps Mexico identify possible sites and provides technical assistance to wind project teams.

Oaxaca and Quintana Roo Workshops and 1.5-kW Turbine Installations. NREL participated in the Mexico/AID Renewable Energy Workshops held in Oaxaca in August 1996 and in Chetumal, Quintana Roo, in August 1998. NREL presented material on wind-powered water pumping and hybrid system design, and provided training for installing 1.5-kW wind-powered water-pumping systems.

Remote Wind and Wind/Photovoltaic Hybrid Power Systems. In the fall of 1998, NREL provided technical assistance for the installation of four separate remote power systems in Quintana Roo, Mexico. NREL is currently monitoring the performance of two of the larger systems, Isla Contoy and Pez Maya.

10-kW Costa de Cocos Wind/Diesel Installation. The work at Costa de Cocos consisted of pre-feasibility and economic analyses, preliminary design, preparation of bid specifications, evaluation of bids, coordination between the vendor and owner on project implementation, participation in project implementation, and follow-up evaluation of the project, including the analysis of monitoring data.

San Juanico Analysis. Working closely with Arizona Public Service (APS), NREL completed extensive economic and performance modeling of a proposed hybrid system for the village of San Juanico. Modeling activities included: tariff structure definition, assessments of ability to pay, loads analysis, site visits and dialogue with villagers, preliminary design studies based on Commission Federal de Electricidad (CFE) and APS cost requirements, extensive meetings with APS and CFE and other interested parties, and time-series modeling of system performance using estimated hourly loads and hourly anemometer data from the site. The installation of this project was completed in May 1999. NREL is continuing its technical analysis and system monitoring of the San Juanico hybrid power project.

Wind and Solar Resource Assessment. The NREL resource assessment team analyzed both wind and solar data for Mexico. The team is producing a catalog of Mexico wind data from various sources and wind resource maps for several regional areas. Two important activities included acquiring digital terrain data for all of Mexico and the analyzing satellite data on ocean wind speeds near the Gulf of Mexico, Caribbean Sea, and Pacific Ocean coasts.

In addition to these activities, NREL conducted assessments of a wind/photovoltaic/diesel hybrid system in Quintana Roo for the fishing lodge of Casa Blanca, analysis of several wind-powered water-pumping sites in Quintana Roo, and analysis of potential protected-area management projects in the states of Quintana Roo and Yucatán.

Planned Activities

Replication of FIRCO Water-Pumping Activities. NREL will continue to support the FIRCO water-pumping projects with the goal of replicating wind-powered water-pumping systems in an area with a good, homogenous wind resource, such as Oaxaca.

Wind Resource Assessment. NREL will produce a catalog of all wind-monitoring activities under the program. Researchers have completed a set of detailed, computerized wind resource maps of two regions of Mexico, the Yucatán Peninsula and Baja California Sur. These maps were generated using automated wind-mapping systems.

NREL will continue technical assessments, prefeasibility analysis, and site visits for wind projects that pass initial screening by project team members in the field. Several small wind projects are being evaluated in the Yucatán Peninsula.

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